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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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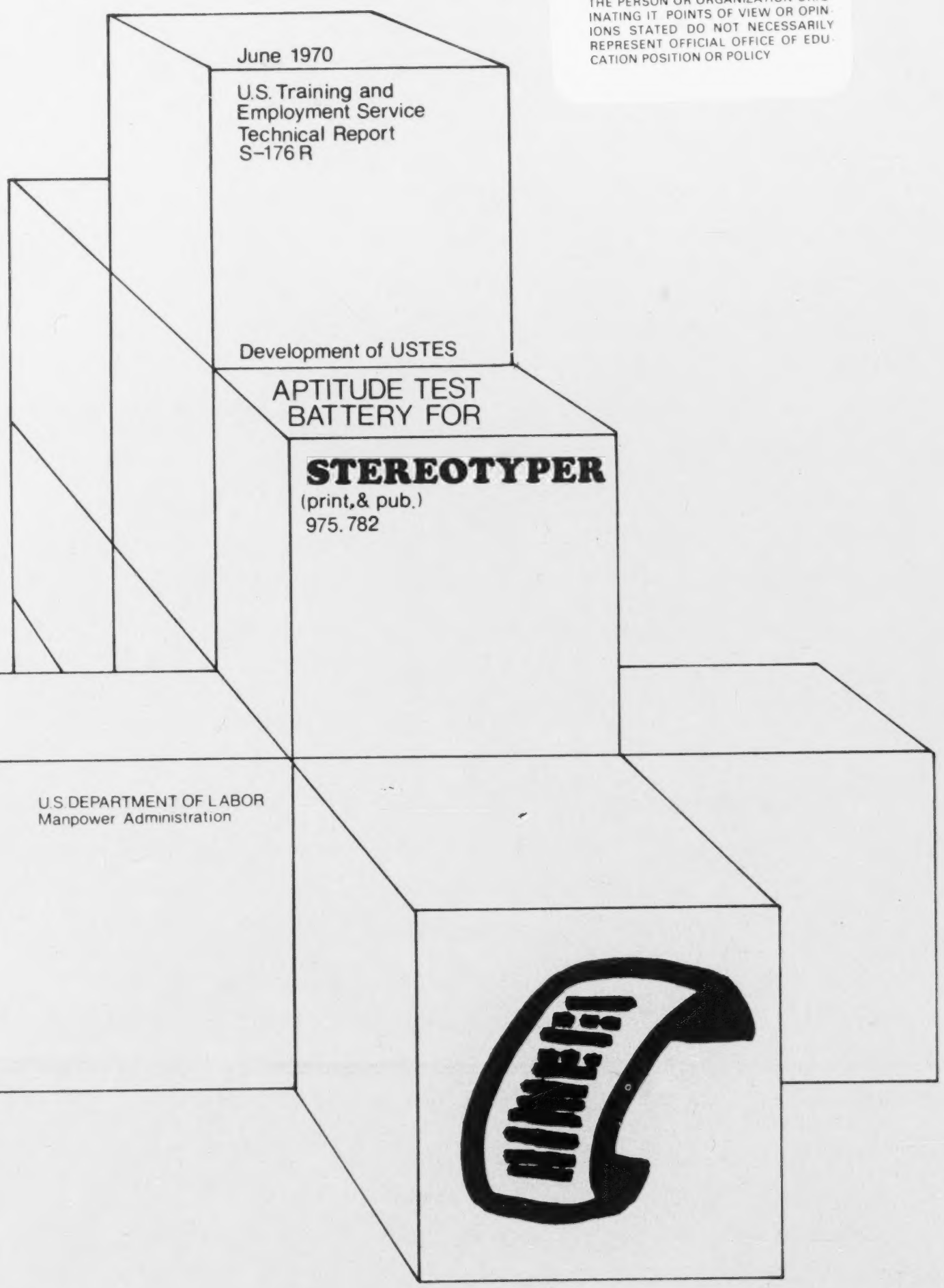

Technical Report on Development of USTES Aptitude Test Battery

For . . . .

Stereotyper (print. & pub.) 975.782

S-176R

(Developed in Cooperation with the
Michigan State Employment Service)

U.S. Department of Labor
Manpower Administration

June 1970

FOREWORD

The United States Training and Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

GATB Study #2284

Development of USTES Aptitude Test Battery

For

Stereotyper (print. & pub.) 975.782-014

S-176R

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Stereotyper (print. & pub.) 975.782-014. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
N - Numerical Ability	80
S - Spatial Ability	80
Q - Clerical Perception	85
K - Motor Coordination	85

Research Summary

Sample:

50 male workers employed as Stererotypers in Detroit, Michigan. This study was conducted prior to the requirement of providing minority group information. Therefore, minority group status is unknown.

Criterion:

Supervisory ratings.

Design:

Concurrent (tests were administered in 1949, 1957, 1958 and 1960; Criterion data were collected in January 1960).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, aptitude-criterion correlations and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .56 ($P/2 < .0005$)

Effectiveness of Norms:

Only 66% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 88% would have been good workers. Thirty-four percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 12% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE I

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	66%	88%
Poor Workers	34%	12%

SAMPLE DESCRIPTION

Size:

N= 50

Occupational Status:

Employed Workers.

Work Setting:

Workers were employed by The Detroit News, The Detroit Times, and The Detroit Free Press.

Employer Selection Requirements:

Education: High school education or equivalent.

Previous Experience: None required.

Tests: None used.

Other: Physical fitness examination.

Principal Activities:

The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience:

All workers in the final sample had at least eight years job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience.

	Mean	SD	Range	r
Age (years)	41.1	10.1	26-66	.158
Education (years)	11.0	1.5	6-13	.043
Experience (months)	237.8	129.5	96-588	.245

EXPERIMENTAL TEST BATTERY

The GATB, B-1001, was adiministered in 1949, 1957, and 1958. The GATB, B-1002A, was administered in 1960. All GATB, B-1001, scores have been converted to equivalent B-1002 scores.

CRITERION

The criterion consisted of supervisory ratings based on the Descriptive Rating Scale, Form SP-21. Item H, worker's ability to improve work methods, was eliminated as inappropriate at the suggestion of the raters.

Ratings were made in January 1960 by superintendents of the three metropolitan newspapers, the President and Vice President of the Sterotypers' Union #9 in Detroit and the Chairman of the technical education program of the union prepared the ratings. Reratings were obtained from two to four weeks after the first rating was completed. The rating scale consisted of eight items covering different aspects of job performance with five alternatives for each item. Weights of one through five, indicating the degree of job performance attained, were assigned to each alternative. A correlation coefficient of .89 was obtained between the two sets of ratings. The final criterion consisted of the combined and averaged rating scale scores multiplied by ten to eliminate the decimal. The possible range of scores was 80 to 400. The actual range was 145-400 with a mean score of 296.7 and a standard deviation of 54.8.

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 34% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score is 280.

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes Q and K, which do not have high correlations with the criterion, were considered for inclusion in the norms because the qualitative analysis indicated that Aptitude K might be important for the job duties and the sample had relatively low standard deviation on this aptitude. Aptitude Q was considered for inclusion in the norms since it was considered of critical importance for the performance of job duties. Tables 3,4, and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear to be important to the work performance)

Aptitudes	Rationale
P - Form Perception	Required for routing plates in order to distinguish white (or color) from black, to determine fracturing of wood fibers in mats, and to determine the bowl depths of the characters.
Q - Clerical Perception	Required to make final proof of plates.
K - Motor Coordination	Required to use plates and operate machinery.
F - Finger Dexterity	Required in use of hand tools to rout plates and repair misshapen type face.
M - Manual Dexterity	Required in trimming, planing, leveling sawing, shaving, and routing plates on machines specifically for these purposes.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N=50

	Mean	SD	Range	r
G - General Learning Ability	107.5	17.5	77-144	.280*
V - Verbal Aptitude	109.4	16.8	74-139	.109
N - Numerical Aptitude	102.7	14.6	72-133	.295*
S - Spatial Aptitude	107.0	20.5	71-160	.283*
P - Form Perception	103.4	21.0	44-152	.210
Q - Clerical Perception	101.1	15.8	66-146	.269
K - Motor Coordination	95.7	14.7	53-128	.219
F - Finger Dexterity	95.5	18.6	43-129	.291*
M - Manual Dexterity	91.8	17.5	49-131	.259

*Significant at the .05 level.

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X	X*	X	X	X
Irrelevant									
Relatively High Mean	X	X		X					
Relatively Low Standard Dev.			X				X		
Significant Correlation With Criterion	X		X	X				X	
Aptitudes to be Considered for Trial Norms	G		N	S		Q*	K	F	

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of the degree to which trial norms consisting of various combinations of aptitudes G, N, S, Q, K and F at trial cutting scores were able to differentiate between the 66% of the sample considered to be good workers and the 34% of the sample considered to be poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For four-aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample; for two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of N-80, S-80, Q-85, and K-85 provided optimum differentiation for the occupation of Stereotyper (print. & pub.) 975.782-014. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .56 (statistically significant at the .0005 level).

TABLE 6

Concurrent Validity of Test Norms
N-80, S-80, Q-85, and K-85

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	28	33
Poor Workers	13	4	17
Total	18	32	50

Phi Coefficient = .56 Chi Square (X^2_y) = 15.7

Significance Level = $P/2 < .0005$

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-38 which is shown in the 1970 edition of Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .28 is obtained with the OAP-38 norms of N-80, S-85, and K-80.

SP-21

A-P-P-E-N-D-I-X

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Sex: Male_____ Female_____

Company Job Title: _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.

☐ 2. Capable of low work output. Can perform at a slow pace.

☐ 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.

☐ 4. Capable of high work output. Can perform at a fast pace.

☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

☐ 3. Performance is acceptable but usually not superior in quality.

☐ 4. Performance is usually superior in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.

☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.

☐ 3. Makes mistakes occasionally. Work needs only normal checking.

☐ 4. Makes few mistakes. Work seldom needs checking.

☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.

☐ 2. Has little knowledge. Knows enough to "get by."

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.

☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.

☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his job without difficulty. Well suited to this kind of work.

☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

☐ 1. Cannot perform different operations adequately.

☐ 2. Can perform a limited number of different operations efficiently.

☐ 3. Can perform several different operations with reasonable efficiency.

☐ 4. Can perform many different operations efficiently.

☐ 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

I. Considering all the factors already rated, and only these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

☐ 1. Would be better off without him. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

S-176R

June 1970

FACT SHEET

Job Title: Stereotyper (print. & pub.) 975.782-014

Job Summary: Performs any one or combination of the following duties to produce metal or plastic plates used in printing magazines, newspapers, and other printed materials. Operates hydraulic or roller type molding presses to form matrices from prepared type-forms. Cleans and planes bottom of type-form to insure a level impression. Puts type-form on molder apron; places paper pulp mat upon type-form and molding cushion of cork fiber, board, or metal sheets on top of mat; adjusts press to impress type into mat, and strips resulting matrix from type-form. Visually checks matrix for imperfections, using magnifying glass. Fills in spots of non-printing area by gluing heavy paper or felt on back of matrix. Pours molten type-metal by hand, or pumps it with an automatic pump, into impressed matrix to form plate for use in printing. Trims damaged or thick type with hand tools, using magnifying glass to observe work. Operates router which is designed to cut away to desired level metal on non-printing areas of stereotype plates. Makes final proof of plates. Uses such tools as trimming knives, saws, engraving chisels, and shavers in the production of plates.

Work Performed: Performs all of, or may specialize in one particular share of, the following duties: Casting: Pours melted type metal by hand or pumps it by automatic pump into a casting box containing a wood-fiber matrix from which printing plates are made. Controls desired size of plate by adjustments of casting box. Allows type metal to cool, opens box and removes plate for finishing. Molding: Heats press bed and lays chase of type on bed. Spreads damp mat, rubber or cork blanket and fiber backing over chase. Lowers press head on assembly to impress type into mat; releases pressure when matrix is dry and strips matrix from type form. Checks matrix for imperfections and trims to desired size. Routing: Removes metal from non-printing area of plate. Operates flat router when removing unwanted material from flat plate by inserting proper cutting bit into head of router and either moving head of machine over plate or moving plate under head. Observes tolerances of ½ to 1/32 of an inch. Operates curved router when removing unwanted material from cylindrical plate by placing plate under head and controlling amount of routing by controlling movement of saddle in which the plate rests. Makes final inspection of plates.

Effectiveness of Norms:

Only 66% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-176R norms, 88% would have been good workers. 34% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the S-176R norms, only 12% would have been poor workers.

Applicability of S-176R Norms:

The aptitude test battery is applicable to jobs which include a majority of duties described above.

GPO 898.798

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